Analytical Laboratory

13339 Hagers Ferry Road
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McGuire Nuclear Complex - MG03A2
Phone: 980-875-5245 Fax: 980-875-4349

Order Summary Report

Order Number: **J12050258**

Project Name: BELEWS BIWEEKLY WWTS

Customer Name(s): Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson

Customer Address: 3195 Pine Hall Rd
Mailcode: Belews Steam Station
Belews Creek, NC 28012

Lab Contact: Jason C Perkins Phone: 980-875-5348

Report Authorized By: (Signature) Digitally signed by jay perkins DN: cn=jay perkins, o=Analytical Lab, ou, email=jay.perkins@duke-energy.com, c=US Date: 2012.06.06 15:39:36 -04'00' **Date:** 6/6/2012

Program Comments:

Please contact the Program Manager (Jason C Perkins) with any questions regarding this report.

Data Flags & Calculations:

Any analytical tests or individual analytes within a test flagged with a Qualifier indicate a deviation from the method quality system or quality control requirement. The qualifier description is found at the end of the Certificate of Analysis (sample results) under the qualifiers heading. All results are reported on a dry weight basis unless otherwise noted.

Data Package:

This data package includes analytical results that are applicable only to the samples described in this narrative. An estimation of the uncertainty of measurement for the results in the report is available upon request. This report shall not be reproduced, except in full, without the written consent of the Analytical Laboratory. Please contact the Analytical laboratory with any questions. The order of individual sections within this report is as follows:

Job Summary Report, Sample Identification, Technical Validation of Data Package, Analytical Laboratory Certificate of Analysis, Analytical Laboratory QC Reports, Sub-contracted Laboratory Results, Customer Specific Data Sheets, Reports & Documentation, Customer Database Entries, Test Case Narratives, Chain of Custody (COC)

Certification:

The Analytical Laboratory holds the following State Certifications : North Carolina (DENR) Certificate #248, South Carolina (DHEC) Laboratory ID # 99005. Contact the Analytical Laboratory for definitive information about the certification status of specific methods.

Sample ID's & Descriptions:

Sample ID	Plant/Station	Collection Date and Time	Collected By	Sample Description
2012010818	BELEWS	23-May-12 7:15 AM	P. GASSETT	FGD Purge Eff
2012010819	BELEWS	23-May-12 7:20 AM	P. GASSETT	EQ TANK EFF.
2012010820	BELEWS	23-May-12 7:25 AM	P. GASSETT	BIOREACTOR 1 INF.
2012010821	BELEWS	23-May-12 7:30 AM	P. GASSETT	BIOREACTOR 2 INF.
2012010822	BELEWS	23-May-12 7:35 AM	P. GASSETT	BIOREACTOR 2 EFF.
2012010823	BELEWS	23-May-12 7:40 AM	P. GASSETT	FILTER BLANK
2012010824	BELEWS	23-May-12 7:45 AM	P. GASSETT	Trip Blank

7 Total Samples

Technical Validation Review

Checklist:

COC and .pdf report are in agreement with sample totals and analyses (compliance programs and procedures).	☑ Yes	☐ No
All Results are less than the laboratory reporting limits.	☐ Yes	☑ No
All laboratory QA/QC requirements are acceptable.	☑ Yes	☐ No
The Vendor Laboratories have been qualified by the Analytical Laboratory	Yes	

Report Sections Included:

- ☑ Job Summary Report
- ☑ Sample Identification
- ☑ Technical Validation of Data Package
- ☑ Analytical Laboratory Certificate of Analysis
- ☐ Analytical Laboratory QC Report
- ☑ Sub-contracted Laboratory Results
- ☐ Customer Specific Data Sheets, Reports, & Documentation
- ☐ Customer Database Entries
- ☑ Chain of Custody
- ☑ Electronic Data Deliverable (EDD) Sent Separately

Reviewed By: DataBase Administrator Date: 6/6/2012

Certificate of Laboratory Analysis

This report shall not be reproduced, except in full.

Order # J12050258

Site: FGD Purge Eff **Sample #: 2012010818**

Collection Date: 23-May-12 7:15 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
INORGANIC IONS BY IC								
Bromide	**110**	mg/L		5	50	EPA 300.0	25-May-12 21:10	JAHERMA
MERCURY (COLD VAPOR) IN WATER								
Mercury (Hg)	**176**	ug/L		5	100	EPA 245.1	31-May-12 14:11	AGIBBS
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**220**	mg/L		0.5	10	EPA 200.7	30-May-12 10:48	DJSULL1
Manganese (Mn)	**7.97**	mg/L		0.05	10	EPA 200.7	30-May-12 10:48	DJSULL1
DISSOLVED METALS BY ICP-MS								
Manganese (Mn)	**6740**	ug/L		20	20	EPA 200.8	31-May-12 13:30	KRICHAR
Selenium (Se)	**104**	ug/L		20	20	EPA 200.8	31-May-12 13:30	KRICHAR
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**290**	ug/L		10	10	EPA 200.8	05-Jun-12 09:52	DJSULL1
Chromium (Cr)	**354**	ug/L		10	10	EPA 200.8	05-Jun-12 09:52	DJSULL1
Copper (Cu)	**176**	ug/L		10	10	EPA 200.8	05-Jun-12 09:52	DJSULL1
Nickel (Ni)	**239**	ug/L		10	10	EPA 200.8	05-Jun-12 09:52	DJSULL1
Selenium (Se)	**7060**	ug/L		20	20	EPA 200.8	05-Jun-12 09:52	DJSULL1
Silver (Ag)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 09:52	DJSULL1
Zinc (Zn)	**295**	ug/L		10	10	EPA 200.8	05-Jun-12 09:52	DJSULL1
SELENIUM SPECIATION								
Vendor Parameter	**Complete**				1	V_AS&C		
TOTAL DISSOLVED SOLIDS								
Vendor Parameter	**Complete**				1	V_PACE		

Site: EQ TANK EFF. **Sample #: 2012010819**

Collection Date: 23-May-12 7:20 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
MERCURY (COLD VAPOR) IN WATER								
Mercury (Hg)	**234**	ug/L		2.5	50	EPA 245.1	31-May-12 14:13	AGIBBS
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**211**	mg/L		0.5	10	EPA 200.7	30-May-12 10:52	DJSULL1
Manganese (Mn)	**6.65**	mg/L		0.05	10	EPA 200.7	30-May-12 10:52	DJSULL1

Certificate of Laboratory Analysis

Order # J12050258

Site: EQ TANK EFF. **Sample #: 2012010819**

Collection Date: 23-May-12 7:20 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
DISSOLVED METALS BY ICP-MS								
Manganese (Mn)	**5880**	ug/L		20	20	EPA 200.8	31-May-12 13:55	KRICHAR
Selenium (Se)	**97.8**	ug/L		20	20	EPA 200.8	31-May-12 13:55	KRICHAR
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**96.9**	ug/L		10	10	EPA 200.8	05-Jun-12 09:55	DJSULL1
Chromium (Cr)	**140**	ug/L		10	10	EPA 200.8	05-Jun-12 09:55	DJSULL1
Copper (Cu)	**71.4**	ug/L		10	10	EPA 200.8	05-Jun-12 09:55	DJSULL1
Nickel (Ni)	**150**	ug/L		10	10	EPA 200.8	05-Jun-12 09:55	DJSULL1
Selenium (Se)	**2690**	ug/L		10	10	EPA 200.8	05-Jun-12 09:55	DJSULL1
Silver (Ag)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 09:55	DJSULL1
Zinc (Zn)	**127**	ug/L		10	10	EPA 200.8	05-Jun-12 09:55	DJSULL1

Site: BIOREACTOR 1 INF. **Sample #: 2012010820**

Collection Date: 23-May-12 7:25 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
INORGANIC IONS BY IC								
Bromide	**98**	mg/L		5	50	EPA 300.0	25-May-12 20:34	JAHERMA
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**190**	mg/L		0.5	10	EPA 200.7	30-May-12 10:56	DJSULL1
Manganese (Mn)	**2.05**	mg/L		0.05	10	EPA 200.7	30-May-12 10:56	DJSULL1
DISSOLVED METALS BY ICP-MS								
Manganese (Mn)	**2000**	ug/L		10	10	EPA 200.8	31-May-12 13:39	KRICHAR
Selenium (Se)	**76.7**	ug/L		10	10	EPA 200.8	31-May-12 13:39	KRICHAR
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 10:34	DJSULL1
Chromium (Cr)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 10:34	DJSULL1
Copper (Cu)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 10:34	DJSULL1
Nickel (Ni)	**20.8**	ug/L		10	10	EPA 200.8	05-Jun-12 10:34	DJSULL1
Selenium (Se)	**93.3**	ug/L		10	10	EPA 200.8	05-Jun-12 10:34	DJSULL1
Silver (Ag)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 10:34	DJSULL1
Zinc (Zn)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 10:34	DJSULL1
SELENIUM SPECIATION								
Vendor Parameter	**Complete**				1	V_AS&C		

Certificate of Laboratory Analysis

Order # J12050258

Site: BIOREACTOR 2 INF. **Sample #: 2012010821**

Collection Date: 23-May-12 7:30 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**185**	mg/L		0.5	10	EPA 200.7	30-May-12 11:00	DJSULL1
Manganese (Mn)	**2.21**	mg/L		0.05	10	EPA 200.7	30-May-12 11:00	DJSULL1
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 10:01	DJSULL1
Chromium (Cr)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 10:01	DJSULL1
Copper (Cu)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 10:01	DJSULL1
Nickel (Ni)	**14.8**	ug/L		10	10	EPA 200.8	05-Jun-12 10:01	DJSULL1
Selenium (Se)	**12.5**	ug/L		10	10	EPA 200.8	05-Jun-12 10:01	DJSULL1
Silver (Ag)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 10:01	DJSULL1
Zinc (Zn)	**< 10**	ug/L		10	10	EPA 200.8	05-Jun-12 10:01	DJSULL1

Site: BIOREACTOR 2 EFF. **Sample #: 2012010822**

Collection Date: 23-May-12 7:35 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
INORGANIC IONS BY IC								
Bromide	**96**	mg/L		5	50	EPA 300.0	25-May-12 20:52	JAHERMA
MERCURY (COLD VAPOR) IN WATER								
Mercury (Hg)	**< 1**	ug/L		1	20	EPA 245.1	31-May-12 14:16	AGIBBS
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**181**	mg/L		0.5	10	EPA 200.7	30-May-12 11:04	DJSULL1
Manganese (Mn)	**3.35**	mg/L		0.05	10	EPA 200.7	30-May-12 11:04	DJSULL1
DISSOLVED METALS BY ICP-MS								
Manganese (Mn)	**3240**	ug/L		10	10	EPA 200.8	31-May-12 13:43	KRICHAR
Selenium (Se)	**< 10**	ug/L		10	10	EPA 200.8	31-May-12 13:43	KRICHAR
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**< 5**	ug/L		5	5	EPA 200.8	05-Jun-12 10:04	DJSULL1
Chromium (Cr)	**< 5**	ug/L		5	5	EPA 200.8	05-Jun-12 10:04	DJSULL1
Copper (Cu)	**< 5**	ug/L		5	5	EPA 200.8	05-Jun-12 10:04	DJSULL1
Nickel (Ni)	**< 5**	ug/L		5	5	EPA 200.8	05-Jun-12 10:04	DJSULL1
Selenium (Se)	**6.65**	ug/L		5	5	EPA 200.8	05-Jun-12 10:04	DJSULL1
Silver (Ag)	**< 5**	ug/L		5	5	EPA 200.8	05-Jun-12 10:04	DJSULL1
Zinc (Zn)	**< 5**	ug/L		5	5	EPA 200.8	05-Jun-12 10:04	DJSULL1
SELENIUM SPECIATION								
Vendor Parameter	**Complete**				1	V_AS&C		

Certificate of Laboratory Analysis

Order # J12050258

Site: FILTER BLANK **Sample #: 2012010823**

Collection Date: 23-May-12 7:40 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
DISSOLVED METALS BY ICP-MS								
Manganese (Mn)	**4.75**	ug/L		1	1	EPA 200.8	31-May-12 13:13	KRICHAR
Selenium (Se)	**1.54**	ug/L		1	1	EPA 200.8	31-May-12 13:13	KRICHAR

Site: Trip Blank **Sample #: 2012010824**

Collection Date: 23-May-12 7:45 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
TOTAL RECOVERABLE METALS BY ICP								
Boron (B)	**0.164**	mg/L		0.05	1	EPA 200.7	30-May-12 10:41	DJSULL1
Manganese (Mn)	**0.006**	mg/L		0.005	1	EPA 200.7	30-May-12 10:41	DJSULL1
TOTAL RECOVERABLE METALS BY ICP-MS								
Arsenic (As)	**< 1**	ug/L		1	1	EPA 200.8	05-Jun-12 09:46	DJSULL1
Chromium (Cr)	**< 1**	ug/L		1	1	EPA 200.8	05-Jun-12 09:46	DJSULL1
Copper (Cu)	**< 1**	ug/L		1	1	EPA 200.8	05-Jun-12 09:46	DJSULL1
Nickel (Ni)	**< 1**	ug/L		1	1	EPA 200.8	05-Jun-12 09:46	DJSULL1
Selenium (Se)	**1.55**	ug/L		1	1	EPA 200.8	05-Jun-12 09:46	DJSULL1
Silver (Ag)	**< 1**	ug/L		1	1	EPA 200.8	05-Jun-12 09:46	DJSULL1
Zinc (Zn)	**< 1**	ug/L		1	1	EPA 200.8	05-Jun-12 09:46	DJSULL1
SELENIUM SPECIATION								
Vendor Parameter	**Complete**				1	V_AS&C		

Pace Analytical®
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(704)875-9092

May 30, 2012

Program Manager
Duke Energy

,

RE: Project: J12050258
Pace Project No.: 92119326

Dear Program Manager:
Enclosed are the analytical results for sample(s) received by the laboratory on May 24, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Analyses were performed at the Pace Analytical Services location indicated on the sample analyte page for analysis unless otherwise footnoted.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kevin Herring

kevin.herring@pacelabs.com
Project Manager

Enclosures

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CERTIFICATIONS

Project: J12050258
Pace Project No.: 92119326

Asheville Certification IDs
2225 Riverside Dr., Asheville, NC 28804
Florida/NELAP Certification #: E87648
Massachusetts Certification #: M-NC030
North Carolina Drinking Water Certification #: 37712
North Carolina Wastewater Certification #: 40
South Carolina Certification #: 99030001
Virginia Certification #: 00072
West Virginia Certification #: 356
Virgina/VELAP Certification #: 460147

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SAMPLE ANALYTE COUNT

Project: J12050258
Pace Project No.: 92119326

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
92119326001	**2012010818**	SM 2540C	LMD	1	PASI-A

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ANALYTICAL RESULTS

Project: J12050258
Pace Project No.: 92119326

Sample: 2012010818 **Lab ID: 92119326001** Collected: 05/23/12 07:15 Received: 05/24/12 14:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
Total Dissolved Solids	**16800**	mg/L	500	1		05/26/12 01:40		

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QUALITY CONTROL DATA

Project: J12050258
Pace Project No.: 92119326

QC Batch: WET/21010
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 92119326001

METHOD BLANK: 769501
Matrix: Water
Associated Lab Samples: 92119326001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	25.0	05/26/12 01:39	

LABORATORY CONTROL SAMPLE: 769502

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	250	266	106	80-120	

SAMPLE DUPLICATE: 769503

Parameter	Units	92119117001 Result	Dup Result	RPD	Qualifiers
Total Dissolved Solids	mg/L	4880	5380	10	

QUALIFIERS

Project: J12050258
Pace Project No.: 92119326

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Acid preservation may not be appropriate for 2-Chloroethylvinyl ether, Styrene, and Vinyl chloride.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-A Pace Analytical Services - Asheville

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: J12050258
Pace Project No.: 92119326

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92119326001	**2012010818**	SM 2540C	WET/21010		

APPLIED SPECIATION
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June 1, 2012

Jay Perkins
Duke Energy Analytical Laboratory
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(704) 875-5245

Project: Belews – FGD WWTS (Bi-Monthly-Wed-Sampling) (LIMS # J12050258)

Dear Mr. Perkins,

Attached is the report associated with four (4) aqueous samples submitted for selenium speciation analysis on May 24, 2012. The samples were received in a sealed cooler at -0.5°C on May 25, 2012. Selenium speciation analysis was performed via ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Any issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report prepared for:

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078

Project: Belews – FGD WWTS (Bi-Monthly-Wed-Sampling) (LIMS # J12050258)

June 1, 2012

1. Sample Reception

Four (4) aqueous samples in 125mL HDPE bottles (provided by Applied Speciation and Consulting) were submitted for selenium speciation analysis on May 24, 2012. The samples were received on May 25, 2012 in a sealed container at -0.5°C.

The samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and was designated a discrete sample identifier. An aliquot of each sample was filtered (0.45µm) and each filtrate was stored in a secure, monitored cryofreezer (maintained at a temperature of -80^{o}C) until selenium speciation analysis could be performed via ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS).

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Selenium Speciation Analysis by IC-ICP-CRC-MS Prior to analysis, an aliquot of each sample was filtered with a syringe filter (0.45µm) and injected directly into a sealed autosampler vial. No further sample preparation was performed as any chemical alteration of a sample may shift the equilibrium of the system, resulting in changes in speciation ratios.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are

standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Selenium Speciation Analysis by IC-ICP-CRC-MS Each sample for selenium speciation analysis was analyzed by ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS) on May 30, 2012. An aliquot of each sample is injected onto an anion exchange column and mobilized by a basic (pH > 7) gradient. The eluting selenium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (CRC) containing a reaction gas which preferentially reacts with interfering ions of the same target mass to charge ratios (m/z). A solid-state detector detects ions transmitted through the mass analyzer and the resulting current is processed by a data handling system.

Retention times for each eluting species are compared to known standards for species identification.

4. Analytical Issues

The overall analyses went well and no significant analytical issues were encountered. All quality control parameters associated with this sample were within acceptance limits.

The estimated method detection limits (eMDLs) for selenite, selenate, and selenocyanate are generated from replicate analyses of the lowest standard in the calibration curve. Not all selenium species are present in preparation blanks; therefore, eMDL calculations based on preparation blanks are artificially biased low.

The eMDL for methylseleninic acid and selenomethionine is calculated from the average eMDL of selenite, selenate, and selenocyanate. The calibration does not contain methylseleninic acid or selenomethionine due to impurities in these standards which would bias the results for other selenium species.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD WWTS (Bi-Monthly-Wed-Sampling)
Contact: Jay Perkins
LIMS #J12050258

Date: June 1, 2012
Report Generated by: Russell Gerads
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Se(IV)	Se(VI)	SeCN	MeSe(IV)	SeMe	Unknown Se Species (n)
FGD Purge Eff	34.2	59.2	ND (<0.43)	0.87	ND (<0.51)	0 (0)
BioReactor 1 Inf	19.2	50.5	ND (<0.11)	1.33	ND (<0.13)	0 (0)
BioReactor 2 Eff	0.38	ND (<0.15)	ND (<0.11)	ND (<0.13)	ND (<0.13)	0 (0)
Metals Trip Blk	0.995	0.053	ND (<0.021)	ND (<0.025)	ND (<0.025)	0 (0)

All results reflect the applied dilution and are reported in µg/L
ND = Not detected at the applied dilution
SeCN = Selenocyanate
MeSe(IV) = Methylseleninic acid
SeMe = Selenomethionine
Unknown Se Species = Total concentration of all unknown Se species observed by IC-ICP-MS
n = number of unknown Se species observed

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD WWTS (Bi-Monthly-Wed-Sampling)
Contact: Jay Perkins
LIMS #J12050258

Date: June 1, 2012
Report Generated by: Russell Gerads
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL*	eMDL 10x	eMDL 50x	eMDL 200x
Se(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.025	0.13	0.51
Se(VI)	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.029	0.15	0.59
SeCN	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.021	0.11	0.43
MeSe(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.025	0.13	0.51
SeMe	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.025	0.13	0.51

eMDL = Estimated Method Detection Limit
*Please see narrative regarding eMDL calculations

Quality Control Summary - Certified Reference Materials

Analyte (µg/L)	CRM	True Value	Result	Recovery
Se(IV)	LCS	9.57	9.08	94.9
Se(VI)	LCS	9.48	9.03	95.3
SeCN	LCS	8.92	8.09	90.7
MeSe(IV)	LCS	6.47	5.39	83.3
SeMe	LCS	9.32	8.25	88.6

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD WWTS (Bi-Monthly-Wed-Sampling)
Contact: Jay Perkins
LIMS #J12050258

Date: June 1, 2012
Report Generated by: Russell Gerads
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicates

Analyte (µg/L)	Sample ID	Rep 1	Rep 2	Mean	RPD
Se(IV)	BioReactor 2 Eff	0.38	0.35	0.36	8.8
Se(VI)	BioReactor 2 Eff	ND (<0.15)	ND (<0.15)	NC	NC
SeCN	BioReactor 2 Eff	ND (<0.11)	ND (<0.11)	NC	NC
MeSe(IV)	BioReactor 2 Eff	ND (<0.13)	ND (<0.13)	NC	NC
SeMe	BioReactor 2 Eff	ND (<0.13)	ND (<0.13)	NC	NC

ND = Not detected at the applied dilution
NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Se(IV)	BioReactor 2 Eff	278.0	272.4	97.9	278.0	281.0	100.9	3.1
Se(VI)	BioReactor 2 Eff	252.3	247.7	98.2	252.3	253.5	100.5	2.3
SeCN	BioReactor 2 Eff	228.8	200.4	87.6	228.8	207.1	90.6	3.3

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Page 7 of 7

[19]Page 1 of 2
DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

Duke Energy

Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

1)Project Name	Belews - FGD WWTS (Bi-Monthly Wed-Sampling)
2)Phone No:	
3) Client:	Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson **
4)Fax No:	
5)Business Unit:	
6)Process:	
Mail Code:	
8)Oper. Unit:	
9)Res. Type:	
10)Reso. Center:	

Analytical Laboratory Use Only

Order #	J12050258
Matrix:	OTHER
Samples Originating From	NC ✓ SC ___
Logged By	EA
Date & Time	5/24/12 1004
Cooler Temp (C)	3.0
SAMPLE PROGRAM	Ground Water ___ NPDES ___ Drinking Water ___ UST ___ RCRA Waste ___

PACE
PO #146146

AS&C
PO#133241

Customer to complete all appropriate non-shaded areas.

Sampling conducted: 2nd and 4th Wednesday

[15]Preserv.: 1=HCL, 2=H_2SO_4, 3=HNO_3, 4=Ice, 5=None

[16]Analyses Required

LAB USE ONLY [11]Lab ID	Se Speciation Bottle ID	[13]Sample Description or ID	Date	Time	Signature	[17]Comp.	[18]Grab	TDS - Pace	Hg - 245.1	Br (IC)	Metals*	Mn, Se, soluble	Se, speciation - vendor to AS&C (important to place filled bottle back into both baggies)
Preserv.								4	3,4		4	3,4	4
2012010818		FGD Purge Eff	5-23-12	07:15	[signature]			1	1	1	1	1	1
819		EQ Tank Eff.		07:20					1		1	1	1
820		BioReactor 1 Inf		07:25						1	1	1	
821		BioReactor 2 Inf		07:30							1		
822		BioReactor 2 Eff		07:35					1	1	1	1	1
823		Filter Blk		07:40								1	
824		Metals Trip Blk		07:45							1		1

Filter ... performed ... field

Customer to complete appropriate columns to right

Customer to sign & date below - fill out from left to right.

1) Relinquished By: W Worden	Date/Time: 5/23/12 14:35	2) Accepted By: cpk	Date/Time: 5-24-12 0940
3) Relinquished By	Date/Time	4) Accepted By	Date/Time
5)Relinquished By: L Davis	Date/Time: 5/24/12 1300	6)Accepted By: Nancy Cullinan Temp -0.5 °C	Date/Time: 5/25/12 9:15
7)Relinquished By: L Davis	Date/Time: 5/24/12 1300	8)Accepted By	Date/Time
9)Seal/Locked By	Date/Time	10) Seal/Lock Opened By	Date/Time
11)Seal/Locked By	Date/Time	12)Seal/Lock Opened By	Date/Time

Customer IMPORTANT: Please indicate desired turnaround.

[22]Requested Turnaround

14 Days ___
*7 Days ___
*48 Hr ___
*Other ___
* Add. Cost Will Apply

5-31-12

Comments

* Metals=TRM/ICP= B, Mn TRM/IMS=As, Ag, Cr, Cu, Ni, Se, Zn thomas.d.johnson@siemens.com

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

Analytical Laboratory Use Only

Order # J1205258 | Matrix: OTHER | Samples Originating From: NC ✓ SC ___

Logged By: RA | Date & Time: 5/24/12 1004 | Cooler Temp (C): 3.0

SAMPLE PROGRAM: Water ___ Ground ___ NPDES ___ Drinking Water ___ UST ___ RCRA Waste ___

[19]Page 1 of 2

DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

Customer must Complete

1)Project Name: Belews - FGD WWTS (Bi-Monthly-Wed-Sampling)		2)Phone No:
2) Client: Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson **		4)Fax No:
5)Business Unit:	6)Process:	Mail Code:
8)Oper. Unit:	9)Res. Type:	10)Reso. Center:

PACE
PO #146146

AS&C
PO#133241

Customer to complete all appropriate non-shaded areas.

Sampling conducted: 2nd and 4th Wednesday

[15]Preserv.: 1=HCL 2=H_2SO_4 3=HNO_3 4=Ice 5=None

[16]Analyses Required

LAB USE ONLY [11]Lab ID	Se Speciation Bottle ID	[13]Sample Description or ID	Date	Time	Signature	[17]Comp.	[18]Grab	TDS - Pace	Hg - 245.1	Br (IC)	Metals*	Mn, Se, soluble	Se, speciation - vendor to AS&C (Important to place filled bottle back into both baggies)
								4	3,4		4	3,4	4
20120108 18		FGD Purge Eff	5-23-12	07:15	RLG			1	1	1	1	1	1
819		EQ Tank Eff.		07:20					1		1	1	
820		BioReactor 1 Inf		07:25						1	1	1	1
821		BioReactor 2 Inf		07:30							1		
822		BioReactor 2 Eff		07:35					1	1	1	1	1
823		Filter Blk		07:40								1	
824		Metals Trip Blk		07:45							1		1

Customer to complete appropriate columns to right

Filtering of Se is performed in the field...

Customer to sign & date below - fill out from left to right.

	Date/Time		Date/Time
1) Relinquished By: W Worden	5/23/12 14:35	2) Accepted By: cpk	5-24-12 0940
3) Relinquished By: Cindy Knox	5-24-12 1410	4) Accepted By:	5-24-12 1410
5)Relinquished By: L Davis	5/24/12 1300	6)Accepted By:	
7)Relinquished By: L Davis	5/24/12 1300	8)Accepted By:	
9)Seal/Locked By		10) Seal/Lock Opened By	
11)Seal/Locked By		12)Seal/Lock Opened By	

Customer, IMPORTANT! Please indicate desired turnaround.

[22]Requested Turnaround
14 Days ___
*7 Days ___
*48 Hr ___
*Other ___
* Add. Cost Will Apply
5-31-12

Comments

* Metals=TRM/ICP= B, Mn TRM/IMS=As, Ag, Cr, Cu, Ni, Se, Zn thomas.d.johnson@siemens.com